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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/536,347	03/27/2000	Andrew D. Bailey III	LAMIP126/P0562	3591
22434	7590	04/09/2004	EXAMINER	
BEYER WEAVER & THOMAS LLP			ALEJANDRO MULERO, LUZ L	
P.O. BOX 778			ART UNIT	
BERKELEY, CA 94704-0778			PAPER NUMBER	

1763

DATE MAILED: 04/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/536,347	Applicant(s) BAILEY, ANDREW D.	
	Examiner Luz L. Alejandro	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,4-7,9-15 and 26-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2,4-7,9-15 and 26-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>0104</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claim 26 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The claim fails to further limit the independent claim due to the amendment to the independent claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 4-7, 12, 26-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dandl, U.S. Patent 5,370,765 in view of Moslehi et al., U.S. Patent 5,464,499, or Sekine et al., U.S. Patent 5,444,207, or Hershkowitz et al., U.S. Patent 5,032,205.

Dandl shows the invention substantially as claimed including a plasma processing apparatus 10' for processing a substrate 103 comprising: a process chamber comprising: a wall defining part of the process chamber; a device 101 for igniting and sustaining within the process chamber a plasma for said processing; and a

plasma confinement arrangement, comprising a magnetic array (105, for example) having a plurality of permanent magnetic elements that are disposed within said process chamber, said plurality of magnetic elements being configured to produce a magnetic field, and wherein said plurality of magnetic elements are within said plasma region, wherein the wall surrounds the magnetic elements and the plasma region so that plasma is able to form plasma deposition on the wall, and wherein the magnetic field produced by the magnetic elements reduces plasma deposition on the wall (see fig. 4A and its description, including col. 13-line 65 to col. 14-line 12).

Dandl is applied as above but fails to expressly disclose wherein each of said plurality of magnetic elements extend substantially from a first end of said process chamber to a chuck. Moslehi et al. discloses an apparatus which comprises a plurality of permanent magnets 72 extending from a first end of said process chamber to a chuck to induce magnetron enhancement within the processing chamber (see, for example, fig. 1). Also, Sekine et al. discloses an apparatus which comprises a plurality of permanent magnets 13 extending from a first end of said process chamber to a chuck for generating a magnetic field within the processing chamber (see, for example, fig. 1, 5a, 5b, and 18). Additionally, Hershkowitz et al. discloses an apparatus which comprises a plurality of permanent magnets extending from a first end of said process chamber to a chuck for generating a magnetic field within the processing chamber (see, for example, fig. 3 and its description). Therefore, in view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Dandl so as to dispose the plurality of magnetic elements

extending substantially from a first end of the process chamber to a chuck because this is an alternative way to generate the magnetic field and enhance the plasma in the processing chamber.

With respect to claims 5-6, note that the permanent magnets of the apparatus of Dandl modified by Moslehi et al. or Sekine et al. or Hershkowitz et al. have physical axis which extends along the plasma region and have magnetic axis which are substantially perpendicular to the physical axis.

Regarding claims 30 and 32, note that the chamber of the apparatus of Dandl is cylindrical (see, for example, col. 7-lines 62-65) and further comprises a dielectric window at the top of the substantially cylindrical shape.

Claims 9 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dandl, U.S. Patent 5,370,765 in view of Moslehi et al., U.S. Patent 5,464,499, or Sekine et al., U.S. Patent 5,444,207, or Hershkowitz et al., U.S. Patent 5,032,205 as applied to claims 2, 4-7, 12, 26-32 above, and further in view of Taira et al., U.S. Patent 6,153,977.

Dandl, Moslehi et al., Sekine et al., and Hershkowitz et al. are applied as above but fail to expressly disclose wherein said magnetic elements are individually contained in sleeves. Taira et al. discloses a permanent magnet 5 contained within a sleeve 2 that shields the magnet from plasma (see fig. 4 and col. 3-line 53 to col. 5-line 16). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Dandl modified by Moslehi et

al., Sekine et al. or Hershkowitz et al. so as to individually contain the permanent magnets in sleeves because in such a way this would prevent any contamination from sputtering of the permanent magnets.

Claims 10-11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dandl, U.S. Patent 5,370,765 in view of Moslehi et al., U.S. Patent 5,464,499, or Sekine et al., U.S. Patent 5,444,207, or Hershkowitz et al., U.S. Patent 5,032,205 as applied to claims 2, 4-7, 12, 26-32 above, and further in view of Grunenfelder, U.S. Patent 5,399,253 or Barankova et al., WO 99/27758.

Dandl, Moslehi et al. Sekine et al. and Hershkowitz et al. do not expressly disclose that the permanent magnets are moved to shift the magnetic field over time. Grunenfelder discloses an apparatus comprising permanent magnets 13,14 that are moved so that the magnetic field shifts over time (see abstract, figs. 3a-4c and col. 6-line 18 to col. 7-line 31). Barankova et al. discloses an apparatus comprising permanent magnets 1,2 that are moved so that the magnetic field shifts over time (see abstract, and figs. 1-9). Therefore, in view of these disclosures, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Dandl modified by Moslehi et al., Sekine et al. and Hershkowitz et al. as to move the permanent magnets in order to provide a rotatable magnetic field in the chamber.

Claims 2, 4-7, 10-12, 15 and 26-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dandl, U.S. Patent 5,370,765 in view of Bailey, III et al., US 6,341,574 or Tokyo Electron LTD, JP 7-130495 (English machine-translation included).

Dandl shows the invention substantially as claimed including a plasma processing apparatus 10' for processing a substrate 103 comprising: a process chamber comprising: a wall defining part of the process chamber; a device 101 for igniting and sustaining within the process chamber a plasma for said processing; and a plasma confinement arrangement, comprising a magnetic array (105, for example) having a plurality of permanent magnetic elements that are disposed within said process chamber, said plurality of magnetic elements being configured to produce a magnetic field, wherein said plurality of magnetic elements are within said plasma region, wherein the wall surrounds the magnetic elements and the plasma region so that plasma is able to form plasma deposition on the wall, and wherein the magnetic field produced by the magnetic elements reduces plasma deposition on the wall (see fig. 4A and its description, including col. 13-line 65 to col. 14-line 12).

Dandl is applied as above but fails to expressly disclose wherein each of said plurality of magnetic elements extend substantially from a first end of said process chamber to a chuck and are moved to shift the magnetic field over time. Bailey, III et al. discloses an apparatus which comprises a plurality of permanent magnets elements 132 extending from a first end of said process chamber to a chuck for generating a magnetic field within the processing chamber and wherein the magnets are adapted to be rotated about their own axes to shift the magnetic field over time (see, for example,

figs. 1 and 6c and col. 14-line 66 to col. 15-line 17). Additionally, Tokyo Electron LTD discloses an apparatus comprising a plurality of permanent magnets 9 extending from a first end of the process chamber to a chuck in order to generate a magnetic field within the processing chamber and moving the permanent magnets 9 around their own axis in order to provide a rotation magnetic field to equalize the plasma (see figs. 1-6 and, for example, paragraph 0003). Therefore, in view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Dandl so as to dispose the plurality of magnetic elements extending substantially from a first end of the process chamber to a chuck and as to move the permanent magnets because this is an alternative way to generate the magnetic field and in order to provide a rotatable magnetic field in the chamber so as to equalize the plasma, therefore, enhancing the plasma in the processing chamber.

With respect to claims 5-6 and 27, note that the permanent magnets of the apparatus of Dandl modified by Bailey, III et al. or Tokyo Electron LTD have physical axis which extend along the plasma region, have magnetic axis which are substantially perpendicular to the physical axis, and are disposed around and outside the periphery of the substrate.

Regarding claims 30 and 32, note that the chamber of the apparatus of Dandl is cylindrical (see, for example, col. 7-lines 62-65) and further comprises a dielectric window at the top of the substantially cylindrical shape.

Claims 9 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dandl, U.S. Patent 5,370,765 in view of Bailey, III et al., US 6,341,574, or Tokyo Electron LTD, JP 7-130495 (English machine-translation included) as applied to claims 2, 4-7, 10-12, 15 and 26-32 above, and further in view of Taira et al., U.S. Patent 6,153,977.

Dandl, Bailey, III et al. or Tokyo Electron LTD are applied as above but fail to expressly disclose wherein said magnetic elements are individually contained in sleeves. Taira et al. discloses a permanent magnet 5 contained within a sleeve 2 that shields the magnet from plasma (see fig. 4 and col. 3-line 53 to col. 5-line 16). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Dandl modified by Bailey III, et al. or Tokyo Electron LTD so as to individually contain the permanent magnet in sleeves because in such a way this would prevent any contamination from sputtering of the permanent magnets.

Claims 2, 4-7, 12, 26-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkowitz et al., U.S. Patent 5,032,205.

Hershkowitz et al. shows the invention substantially as claimed including a plasma processing apparatus for processing a substrate comprising: a process chamber 90 comprising: a wall defining part of the process chamber; a device for igniting and sustaining within the process chamber a plasma for said processing; and a plasma confinement arrangement, comprising a magnetic array 14 having a plurality of

permanent magnetic elements that are disposed within said process chamber, said plurality of magnetic elements being configured to produce a magnetic field, and wherein said plurality of magnetic elements are within said plasma region, wherein the wall surrounds the magnetic elements and the plasma region so that plasma is able to form plasma deposition on the wall, and wherein the magnetic field produced by the magnetic elements reduces plasma deposition on the wall (see fig. 5 and its description).

Hershkovitz et al. fails to expressly disclose in the embodiment of fig. 5 wherein each of said plurality of magnetic elements extend substantially from a first end of said process chamber to a chuck. However, Hershkovitz et al. in the embodiment of fig. 3, discloses an apparatus which comprises a plurality of permanent magnets extending from a first end of said process chamber to a chuck for generating a magnetic field within the processing chamber (see, for example, fig. 3 and its description). Therefore, in view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of the embodiment of fig. 5 of Hershkovitz et al. so as to dispose the plurality of magnetic elements extending substantially from a first end of the process chamber to a chuck because this is an alternative way to generate the magnetic field and enhance the plasma in the processing chamber.

With respect to claims 5-6, note that the permanent magnets of the modified apparatus of Hershkovitz et al. have physical axis which extends along the plasma

region and have magnetic axis which are substantially perpendicular to the physical axis.

Regarding claims 30, note that the chamber of the apparatus of Hershkowitz et al. is cylindrical (see, for example, col. 7-lines 62-65).

Claims 9 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkowitz et al., U.S. Patent 5,032,205 as applied to claims 2, 4-7, 12, 26-31 above, and further in view of Taira et al., U.S. Patent 6,153,977.

Hershkowitz et al. is applied as above but fails to expressly disclose wherein said magnetic elements are individually contained in sleeves. Taira et al. discloses a permanent magnet 5 contained within a sleeve 2 that shields the magnet from plasma (see fig. 4 and col. 3-line 53 to col. 5-line 16). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the modified apparatus of Hershkowitz et al. so as to individually contain the permanent magnets in sleeves because in such a way this would prevent any contamination from sputtering of the permanent magnets.

Claims 10-11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkowitz et al., U.S. Patent 5,032,205 as applied to claims 2, 4-7, 12, 26-31 above, and further in view of Grunenfelder, U.S. Patent 5,399,253 or Barankova et al., WO 99/27758.

Hershkowitz et al. does not expressly disclose that the permanent magnets are moved to shift the magnetic field over time. Grunenfelder discloses an apparatus comprising permanent magnets 13,14 that are moved so that the magnetic field shifts over time (see abstract, figs. 3a-4c and col. 6-line 18 to col. 7-line 31). Barankova et al. discloses an apparatus comprising permanent magnets 1,2 that are moved so that the magnetic field shifts over time (see abstract, and figs. 1-9). Therefore, in view of these disclosures, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the modified apparatus of Hershkowitz et al. as to move the permanent magnets in order to provide a rotatable magnetic field in the chamber.

Response to Arguments

Applicant's arguments with respect to newly amended independent claim 2 and claim 15 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments filed 1/09/04 have been fully considered but they are not persuasive. With respect to applicant argument regarding the rejections over the Taira et al. reference, the examiner kindly disagrees since it should be noted that applicant is referring to the embodiment of fig. 1 which shows the invention of the patent while the examiner is relying on the embodiment of fig. 4 which shows the prior art example. Therefore, the analysis of the figures made by the applicant is not proper. Furthermore, there are not unexpected results shown for individually containing the permanent


magnets within sleeves as opposed to containing a plurality of permanent magnets within a sleeve.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 571-272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Luz L. Alejandro
Primary Examiner
Art Unit 1763

April 5, 2004